NOTICE TO
FLOOD INSURANCE STUDY USERS

Individual components of this Flood Insurance Study (i.e., text, tables, profiles, and maps) are all subject to revision as additional data become available. Because revised components may be issued separately, study users should consult the community map repository for those components that are currently effective.

In cases where this Flood Insurance Study and any components thereof warrant revision, a Revisions Description section may be incorporated into this text. When applicable, study users should refer to the Revisions Description to obtain pertinent data and information concerning revisions.

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Flood Boundary and Floodway Map

PUBLISHED SEPARATELY:

Flood Insurance Rate Map Index
Flood Insurance Rate Map

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FLOOD INSURANCE STUDY

CITY OF GRIMES,
POLK COUNTY, IOWA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the City of Grimes, Polk County, Iowa, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert the City of Grimes to the regular program of flood insurance by the Federal Emergency Management Agency (FEMA). Local and regional planners will use this study in their efforts to promote sound flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these Federally-supported studies are based. These criteria take precedence over the minimum Federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 44 CFR, 60.3 (d). In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements and criteria.

1.2 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by Associated Engineers, Inc. for the Federal Emergency Management Agency, under Contract No. H-4737. This study was completed in August 1980.

Approximate flood boundaries were determined by Michael Baker, Jr., Inc. under contract to the Federal Emergency Management Agency.

1.3 Coordination

Streams requiring detailed study were identified at a meeting attended by representatives of the Study Contractor, FEMA, and representatives of the City of Grimes on April 6, 1978. A community coordination meeting was held on February 14, 1979, which was attended by representatives of the Study Contractor and the city clerk of the City of Grimes.

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Results of the hydrologic analyses were coordinated with the Iowa Natural Resources Council, the U.S. Geological Survey (USGS), the U.S. Army Corps of Engineers (COE), the U.S. Department of Agriculture, Soil Conservation Service (SCS), the Bureau of Reclamation, and the U.S. Water Resources Council.

On June 8, 1982, the results of the work by the Study Contractor were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the City of Grimes, Polk County, Iowa. The area of study is shown on the Vicinity Map (Figure 1).

The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction for the next five years, through August 1985.

Approximate methods of analysis were used to study those areas having a low development potential or minimal flood hazards as identified at the initiation of the study. The scope and methods of study were proposed to and agreed upon by FEMA and the City of Grimes.

Little Beaver Creek, within the corporate limits, and Little Beaver Creek Tributary, from the downstream corporate limit to just downstream of Sixth Street, were studied by detailed methods.

2.2 Community Description

The City of Grimes is located in western Polk County, near the center of Iowa. It is approximately 10 miles northwest of Des Moines, Iowa. The population is 1,342 according to a special census taken in 1975.

Based on the weather gaging station in Des Moines, the mean annual temperature is 51 degrees Fahrenheit (F.). Generally, July, the hottest month, averages 77 degrees F. and January, the coldest month, averages 23 degrees F. Temperature extremes have been recorded at -21 degrees F. and 105 degrees F.

The average annual rainfall is 30.9 inches of which 70 percent or 21.5 inches falls during the growing season of April to September. An average of 30 inches of snowfall occurs each winter with about 30 percent or 8.7 inches occurring in January.

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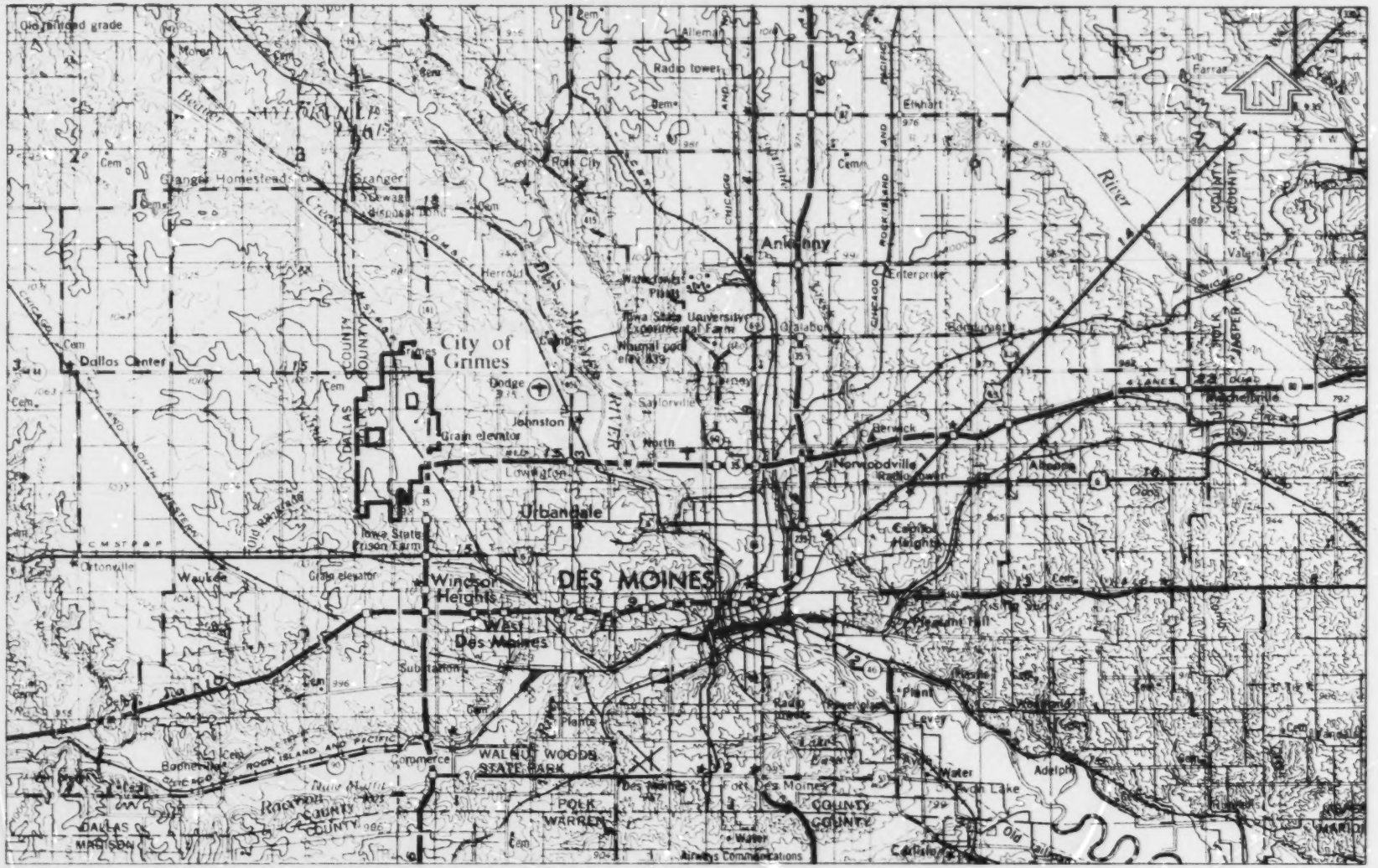

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GRIMES, IA

(POLK CO.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

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Grimes is in the Des Moines River basin. Two principal streams that flow through the city are Little Beaver Creek and Little Beaver Creek Tributary. The two streams flow generally toward the north having their confluence just north of the city limits, with well-defined drainageways. The city has gently undulating topography and lacks pronounced erosional dissection. The surface of this area is close to that which was present during the last ice age.

The city lies within the Clarion-Nicollet Webster (CNW) soil association area (References 1 and 2).

The CNW soils were developed from glacial till derived sediments under prairie grass vegetation. The major topography of these soils is level to gently sloping. The Clarion loam soil is found on the upland highs and ridges, and has good internal drainage with a slight to severe erosion hazard. The Nicollet loam soils are located on upland intermediate high on lesser slopes than the Clarion. This soil has somewhat poor internal drainage and is slightly susceptible to erosion. The Webster silty clay loam soil has poor internal drainage and is not susceptible to erosion. The Webster soils are typically found on the upland flats on zero to two percent slopes.

The geological deposits in and around Grimes are those of glacial origin, the most recent of which was the Cary Substage of the Wisconsin Glacier. Thirty to 60 feet of calcareous, loamy material was deposited by this glacier in this part of the county.

Alluvium (sand, gravel or silty clay) is a material deposited by either melting glacial ice or overflowing streams. This material is found in and adjacent to all drainageways.

The entire area is underlain by bedrock of the Pennsylvanian system consisting of a shale formation. This formation may contain some thin seams of coal and interbedded limestone or sandstone. This bedrock unit is buried beneath the glacial till, and alluvium deposits (References 1 and 2).

2.3 Principal Flood Problems

The history of flooding of the streams in the City of Grimes indicates that flooding usually occurs during the spring and summer months of the year. The area is particularly susceptible to flooding caused by a combination of rainfall and snowmelt.

Little Beaver Creek and Little Beaver Creek Tributary are both subject to flooding. No USGS gaging stations are located in the study area. No high water marks are known to exist on either of these streams in Grimes.

2.4 Flood Protection Measures

No major flood control structures exist on Little Beaver Creek or its tributary in Grimes or in the basins upstream from Grimes.

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State regulation of the flood plains of Iowa rivers and streams is provided primarily by the Iowa Resources Council. The Resources Council has the duty and authority to establish and enforce an appropriate comprehensive statewide program for the control, utilization, and protection of the surface and groundwater resources of the state. Prior approval of the Resources Council is required for any structure, dam, obstruction, deposit, or excavation, to be erected, made, used or maintained in or on the floodway or flood plains of any river or stream. Similarly, works of any nature for flood control may not be constructed or installed until the proposed works are approved by the Resources Council. The Resources Council is authorized to establish and enforce regulations for the orderly development and wise use of the flood plains of any river or stream within the state. The Resources Council is directed to determine the characteristics of floods which reasonably may be expected to occur and to establish encroachments limits, protection methods, and minimum protection levels appropriate to flooding characteristics of the stream and to reasonable use of the flood plains.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (one percent chance of annual occurrence) in any 50-year period is about 40 percent (four in ten), and for any 90-year period, the risk increases to about 60 percent (six in ten). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail affecting the community.

The discharges for Little Beaver Creek and Little Beaver Creek Tributary in the City of Grimes were calculated using the SCS method for computing peak rates of discharge for small watersheds (Reference 3). Graphs are used to obtain a basic peak discharge rate for a 24-hour duration storm associated with a watershed in a natural condition. The peaks are then modified to account for the effect of urbanization.

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The culvert under the Chicago, Milwaukee, St. Paul and Pacific Railroad on Little Beaver Creek partially obstructs the 50-, 100- and 500-year frequency flood discharges. The culvert will pass about 80 percent of the flow while about 20 percent of the flow weirs over the railroad to the north of the creek. Therefore, the discharges through the culvert for the 50-, 100- and 500-year frequency floods were decreased to 1,025, 1,085 and 1,100 cubic feet per second (cfs), respectively, then increased again to their original values.

These reduced discharges for Little Beaver Creek were determined by balancing the water-surface elevation of the upstream side of the Chicago, Milwaukee, St. Paul and Pacific Railroad using pressure flow and weir flow equations and equating the total flow with the flow originally arrived at using the above referenced SCS method, Q pressure + Q weir = Q total.

Peak discharges for the 10-, 50-, 100-, and 500-year floods of each flooding source studied in detail in the community are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
LITTLE BEAVER CREEK					
Tributary B, at downstream corporate limits	2.7	750	1,100	1,250	1,600
LITTLE BEAVER CREEK TRIBUTARY					
Tributary A, above confluence with Little Beaver Creek	2.1	570	830	950	1,240
Just downstream Little Beaver Road	0.9	290	420	490	630

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the streams in the community were carried out to provide estimates of the elevations of the floods of the selected recurrence intervals along each flooding source studied in detail.

Cross sections for the backwater computations were obtained from aerial survey flown in April 1979. The below-water portion of the cross sections were obtained by field measurement. All bridges and culverts were measured in the field to obtain the necessary dimensions and elevations.

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Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles. For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map.

Channel roughness factors (Manning's "n") used in the hydraulic computations were chosen by engineering judgment and based on field observations of the streams and flood plain areas. For Little Beaver Creek, roughness coefficients vary from 0.018 to 0.05 in the channel and 0.045 to 0.06 in the overbanks and for Little Beaver Creek Tributary, 0.018 to 0.04 in the channel and 0.04 to 0.06 in the overbanks.

Water-surface elevations of floods of the selected recurrence intervals were computed through use of the COE HEC-2 step-backwater computer program (Reference 4).

Starting water-surface elevations for Little Beaver Creek were taken from the County of Polk, Iowa Flood Insurance Study (Reference 5) and determined for Little Beaver Creek Tributary by normal depth calculations.

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals.

The hydraulic analyses for this study are based only on the effects of unobstructed flow. The flood elevations as shown on the profiles are, therefore, considered valid only if hydraulic structures, in general, remain unobstructed and if channel and overbank conditions remain essentially the same as ascertained during this study.

All elevations are referenced from National Geodetic Vertical Datum of 1929 (NGVD); elevation reference marks used in the study are shown on the maps.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by FEMA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100-year and the 500-year floods have been delineated using the elevations determined at each cross section; between cross sections the boundaries were interpolated using USGS quadrangle maps at a scale of 1:24000 and contour interval of 10 feet (Reference 6).

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The approximate flood boundaries, caused by weir flow over the Chicago, Milwaukee, St. Paul and Pacific Railroad on the north side of Little Beaver Creek, were determined by extending the known detailed flood boundaries on the upstream side of the Chicago, Milwaukee, St. Paul and Pacific Railroad using the USGS quadrangle maps referenced above.

The remaining approximate flood boundaries were taken from the Flood Hazard Boundary Map (Reference 7).

The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map. Small areas within the flood boundaries may lie above the flood elevations and, therefore, not be subject to flooding; owing to lack of detailed topographical information or to limitations of the map scale, such areas are not shown. In cases where the 100-year and the 500-year flood boundaries are close together, only the 100-year boundary has been shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of FEMA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced.

The floodways presented in this study were computed on the basis of equal conveyance reduction of the flood plain. The results of these computations were tabulated at selected cross sections for each stream segment for which a floodway was computed (Table 2).

As shown on the Flood Boundary and Floodway Map, the floodway widths were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or collinear, only the floodway boundary has been shown.

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FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
LITTLE BEAVER CREEK								
A	30,067	239[2]	709	5.0	914.2	914.2	915.2	1.0
B	30,717	35[2]	205	6.1	916.3	916.3	917.0	0.7
C	31,417	35	200	6.2	919.4	919.4	919.9	0.5
D	31,843	38	192	6.5	921.4	921.4	922.0	0.6
E	32,093	76	219	13.1	922.8	922.8	922.8	0.0
F	32,128	76	682	4.3	928.9	928.9	928.9	0.0
G	32,308	46	409	3.1	929.0	929.0	929.0	0.0
H	32,448	46	379	3.3	929.0	929.0	929.0	0.0
I	32,498	46	397	3.2	929.5	929.5	929.5	0.0
J	32,673	75	352	3.6	929.5	929.5	929.5	0.0
K	33,048	65	263	4.8	930.0	930.0	930.0	0.0
L	33,588	56	194	6.5	931.8	931.8	931.8	0.0

[1]FEET ABOVE MOUTH
[2]THIS WIDTH IS BEYOND CORPORATE LIMITS

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GRIMES, IA
(POLK CO.)

FLOODWAY DATA

LITTLE BEAVER CREEK

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FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE
LITTLE BEAVER CREEK TRIBUTARY							
A	1270	41	190	5.0	917.0	916.8	0.2
B	1980	36	167	5.7	919.2	919.1	0.1
C	2780	36	167	5.7	922.0	922.0	0.0
D	3605	55	212	4.5	924.9	924.6	0.3
E	4255	45	183	5.2	927.0	926.1	0.9
F	4755	37	157	6.1	929.0	928.3	0.7

[1]FEET ABOVE MOUTH

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TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GRIMES, IA
(POLK CO.)

FLOODWAY DATA

LITTLE BEAVER CREEK TRIBUTARY

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

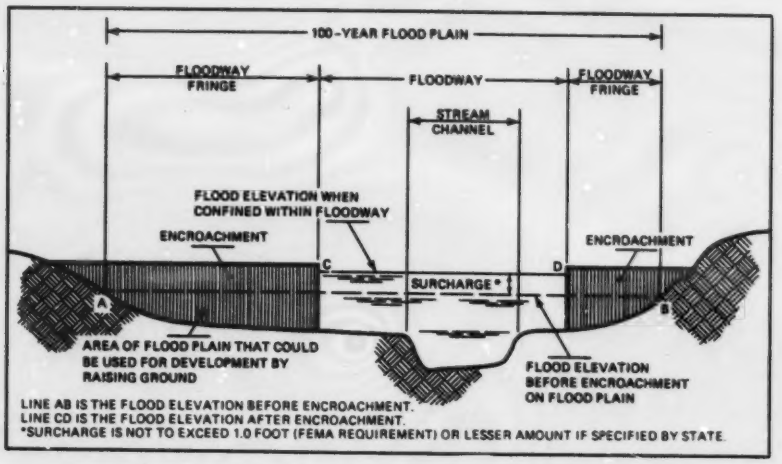
100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT.
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT.
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FIGURE 2 - Floodway Schematic

The floodways in this report are recommended to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, FEMA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHF), and flood insurance zone designations for each flooding source affecting the City of Grimes.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

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The locations of the reaches determined for the City of Grimes are shown on the Flood Profiles and are summarized in Table 3, "Flood Insurance Zone Data."

5.2 Flood Hazard Factors

The FHF is used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest 0.5 foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year flood water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire incorporated area of the City of Grimes was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations are shown or FHFs determined.
Zones A2-A4, A10:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations are shown, and zones subdivided according to FHF.
Zone B:	Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; or areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.

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Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the City of Grimes is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by FEMA.

6.0 OTHER STUDIES

A Flood Insurance Study for the County of Polk is currently in progress in which Little Beaver Creek is being studied by detailed methods. Discharge values and water-surface elevations used in this report are the same as those used in the County of Polk Flood Insurance Study (Reference 5).

A Flood Hazard Boundary Map has been published for the community (Reference 7). The differences between the Flood Hazard Boundary Map and this study are justified due to the more detailed nature of this Flood Insurance Study.

This report either supersedes or is compatible with all previous studies published on streams studied in this report and should be considered authoritative for the purposes of the National Flood Insurance Program.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic and other pertinent data used in this study can be obtained by contacting the Natural and Technological Hazards Division, Federal Emergency Management Agency, 911 Walnut Street, Kansas City, Missouri 64106.

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FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
LITTLE BEAVER CREEK							
REACH 1	0001	−1.0	−0.3	0.6	010	A2	VARIES–SEE MAP
LITTLE BEAVER CREEK TRIBUTARY							
REACH 1	0001	−1.4	−0.3	0.5	015	A3	VARIES–SEE MAP

[1]FLOOD INSURANCE RATE MAP PANEL
[2]WEIGHTED AVERAGE
[3]ROUNDED TO NEAREST FOOT

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TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GRIMES, IA
(POLK CO.)

FLOOD INSURANCE ZONE DATA

LITTLE BEAVER CREEK - LITTLE BEAVER CREEK TRIBUTARY

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2. Iowa State University, Department of Agronomy, "Principal Soils of Iowa - Special Report No. 42," January 1975.

3. U.S. Department of Agriculture, Soil Conservation Service, Technical Release No. 55, Urban Hydrology for Small Watersheds, January 1975.

4. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2, Water-Surface Profiles, Davis, California, November 1976.

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7. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, City of Grimes, Iowa, March 1976.

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U.S. Geological Survey, Iowa Natural Resources Council, Bulletin No. 7, "Drainage Area of Iowa Streams," March 1974.

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9.0 REVISIONS DESCRIPTION (Revised: April 30, 1986)

9.1 Purpose

The purpose of this Flood Insurance Study Revisions Description is to incorporate revised data into this currently effective Flood Insurance Study for the City of Grimes, Polk County, Iowa. This Revisions Description is intended to provide updated information that aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

9.2 Acknowledgments

The hydraulic analyses for this Revisions Description were performed by the Iowa Department of Water, Air, and Waste Management. The Federal Emergency Management Agency reviewed and accepted these data for purposes of this revision.

9.3 Scope

The revision involved Little Beaver Creek from approximately 250 feet downstream of the Chicago, Milwaukee, St. Paul & Pacific Railroad to the upstream corporate limits. A new hydraulic analysis for Little Beaver Creek was performed to incorporate the breach in the Chicago, Milwaukee, St. Paul & Pacific Railroad grade. The detailed flood boundaries for Little Beaver Creek Tributary were revised to reflect updated topographic data.

9.4 Hydrologic and Hydraulic Analyses

The hydraulic anlaysis for Little Beaver Creek was revised using the HEC-2 step-backwater computer model (Reference 1). Cross-section data were obtained through field survey for the area near the Chicago, Milwaukee, St. Paul & Pacific Railroad. The roughness coefficients (Manning's "n") near the railroad bridge were revised to 0.018 for the channel and a range of 0.045 to 0.050 for the overbank areas.

The base flood elevations, flood insurance zone designations, and floodway for Little Beaver Creek have been revised as described in this Revisions Description and are shown on the revised Floodway Data table, Flood Insurance Zone Data table, Flood Profile, Flood Insurance Rate Map, and Flood Boundary and Floodway Map. This revised information supersedes those portions of the original Flood Insurance Study for the City of Grimes.

9.5 Floodways

Floodway computations for Little Beaver Creek were revised as a result of a new hydraulic analysis. The floodways were computed on the basis of equal conveyance reduction from each side of the floodplain. The results of these computations were tabulated at selected cross sections for each stream segment for which a floodway was revised and are presented in Table 2, Floodway Data.

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9.6 Other Studies

The Flood Insurance Study for the Unincorporated Areas of Polk County, Iowa, has been published (Reference 2). This new information for Little Beaver Creek will result in a mismatch with the Polk County Flood Insurance Study because of the new hydraulic analysis. The information found in this report should be considered the most recent and accurate data available and will supersede other information available for Little Beaver Creek.

9.7 Location of Data

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, Federal Emergency Management Agency, Federal Office Building, Room 300, 911 Walnut Street, Kansas City, Missouri 64106.

9.8 References and Bibliography

1. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water-Surface Profiles Generalized Computer Program, Davis, California, 1979.

2. Federal Emergency Management Agency, Flood Insurance Study, Polk County, Unincorporated Areas, Iowa, March 1984.

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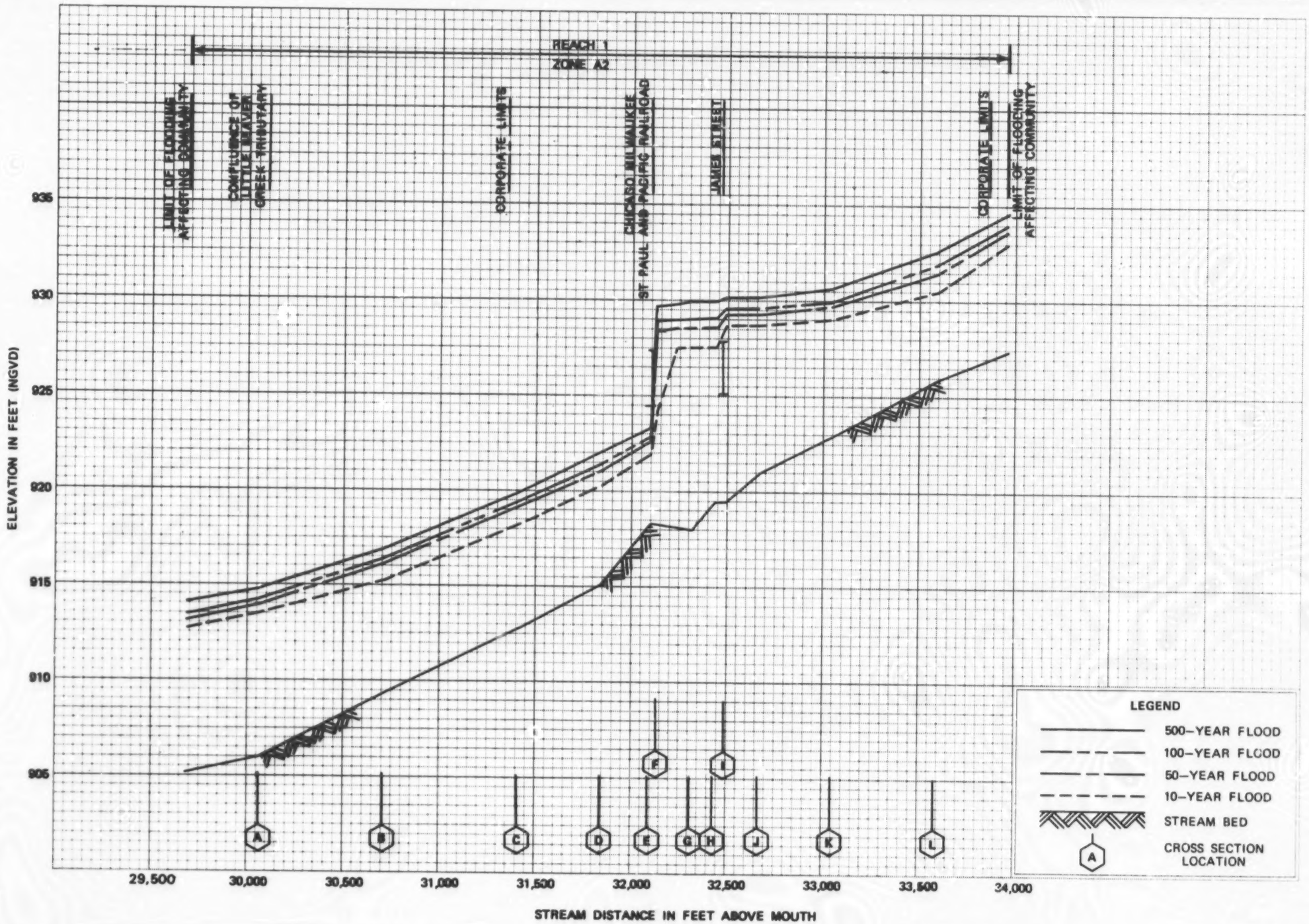

FLOOD PROFILES

LITTLE BEAVER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF GRIMES, IA
(POLK CO.)

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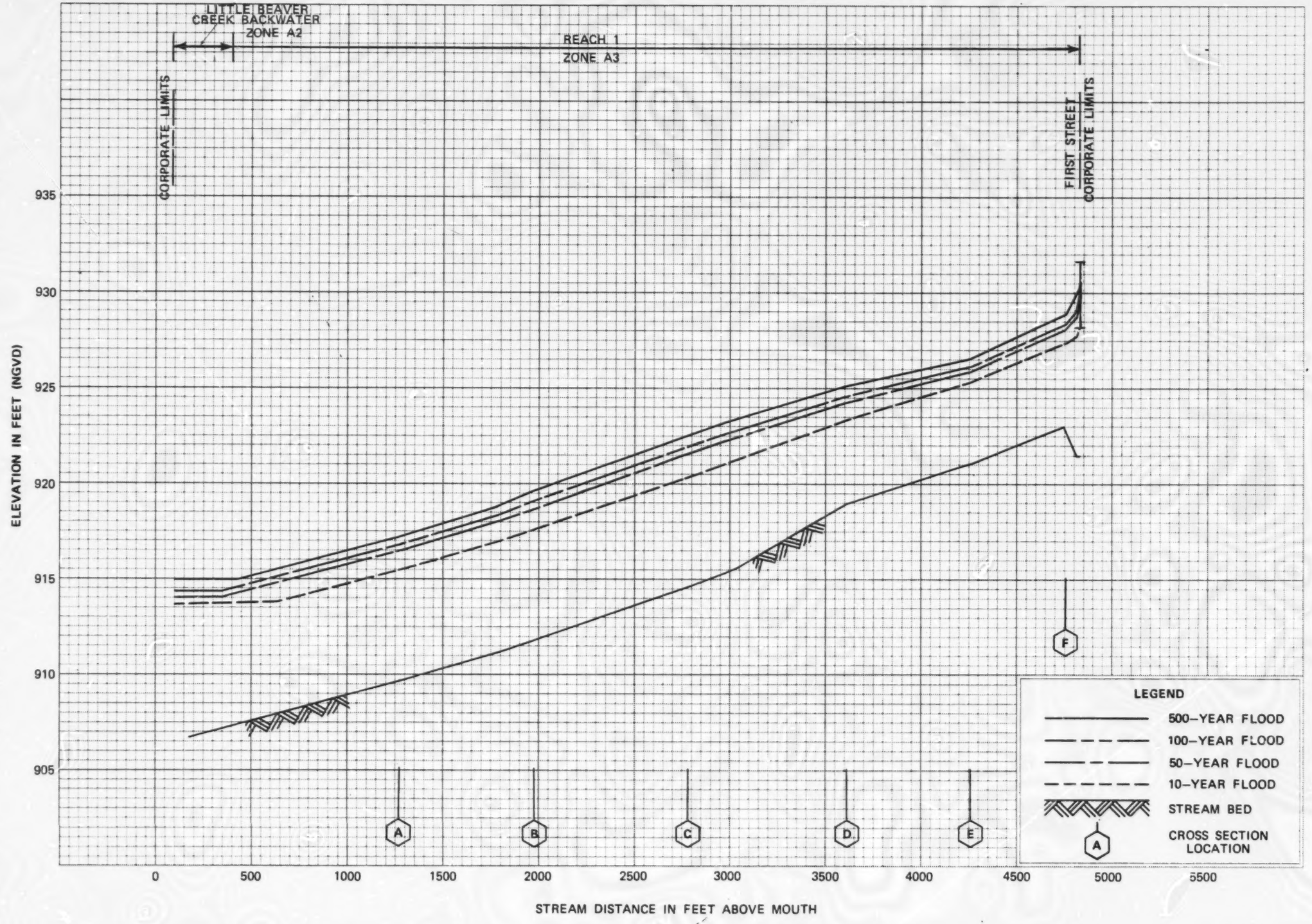

FLOOD PROFILES

LITTLE BEAVER CREEK TRIBUTARY

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